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ABSTRACT

This report presents a review of the historical background, progress, and problems associated with the development of collaborative efforts between vocational education and various sectors of the defense establishment. Through extensive document review, supplemented by telephone and on-site discussions with educators and employers, the benefits that accrue to both groups have been documented. The following patterns of collaboration are identified, along with examples from on-going programs: employer representatives as school advisors, job training programs for employers, employer representatives as trainers, loans or gifts of equipment to schools, brokering of educational services, small business linkages, and training material repositories. The report outlines preliminary standards of program success, proposes factors contributing to successful linkages, and presents possible barriers to cooperation. Among the factors that appear to be instrumental in the success of vocational education-defense establishment collaborative efforts are the following: (1) recognition that providing training services to employers is serving students; (2) recognition on the part of state government that vocational education has a role to play in economic development, which can contribute to defense preparedness; (3) emphasis on determining the common needs of business and vocational education; (4) openness of communication; (5) realistic commitments by vocational education to employers; (6) a current marketing plan; (7) staff members actually engaged in promotion and sales; and (8) recognition of the differences between the business environment and education. (KC)

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VOCATIONAL EDUCATION–DEFENSE ESTABLISHMENT COLLABORATION:

STATE-OF-THE-PRACTICE REPORT

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MARCH 1985

U.S. DEPARTMENT OF EDUCATION
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SUMMARY

This report presents a review of the historical background, progress, and problems associated with the development of collaborative efforts between vocational education and various sectors of the defense establishment. Through extensive document review, supplemented by telephone and on-site discussions with educators and employers, the benefits that accrue to both groups have been documented and the following patterns of collaboration identified, along with examples from on-going programs:

- Employer representatives as school advisors,
- Job-training programs for employers,
- Loans or gifts of equipment to schools,
- Employer representatives as trainers,
- Brokering of educational services,
- Small business linkages, and
- Training material repositories.

Preliminary standards of program success are outlined, factors contributing to successful linkages are proposed, and possible barriers to cooperation are presented. Among the factors that appear to be instrumental in the success of vocational education-defense establishment collaborative efforts are:

1. Clear recognition that providing training services to employers is actually serving individuals (their clients) and thereby fulfulling the mission of vocational education.
2. Recognition on the part of state legislatures and governors that vocational education has a definite role to play in economic development, which in turn can contribute to defense preparedness. This recognition should be supported by funds specifically earmarked for such purposes so that the more traditional programs of vocational education would not suffer financially by increased efforts devoted to industry-education collaboration.
3. Special emphasis on determining the common needs of business and vocational education.
4. Openness of communication and serious attempt to understand each other's position.
5. Realistic commitments made by vocational education to employers.
6. A marketing plan developed and updated periodically.

7. Staff members actually engaged in promotion and sales.

8. Recognition of the differences between the business environment and education:

   - importance of deadlines and
   - need for flexibility.

On a more general level, the following conclusions are proposed as a means of gaining a clearer perspective on the problem of vocational education-defense establishment collaboration:

- Vocational education-defense establishment collaboration should be viewed as part of a much larger problem of industry-education cooperation, or more appropriately perhaps, employer-education cooperation.

- Defense preparations are not independent of other urgent concerns (such as stimulating economic development and enhancing industrial productivity) that impact on skilled labor.

- Both the immediate and long-term results of improved collaboration should be viewed in a broader light of overall mutual benefits to both vocational education and to the defense establishment--not solely in terms of improved defense preparedness.

- Regardless of who initiates the efforts to expand cooperation between vocational education and defense-related agencies, at the earliest time the local school agencies and the local businesses must be brought together. Federal and state agencies could help increase this cooperation with significant benefits to economic development and to defense preparedness at relatively modest cost.

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I. INTRODUCTION

Why the Current Focus on Vocational Education-Defense Establishment Collaboration?

During the past few years, increasing attention has been devoted to the need for improving the cooperation between vocational education and the various sectors of the defense establishment.[1] The major stimulus behind this attention is the concern that projected shortages of skilled workers will prevent our defense industrial base from expanding fast enough to cope with a possible national defense emergency (U.S. House of Representatives, 1980).

In response to this concern, the U.S. Department of Education, through its Office of Vocational and Adult Education, issued a request for proposals to conduct a project for developing workshop materials to improve cooperation between vocational education and the defense establishment. In December 1983, the Department of Education awarded the contract to the National Association for Industry-Education Cooperation, with the American Institutes for Research serving as subcontractor. The major tasks of the project--in addition to the development of this State-of-the-Practice Report--are to:

- develop standards for assessing the effectiveness of linkage efforts between vocational education and the defense establishment,
- identify and document exemplary linkages,
- analyze the factors contributing to the development of these exemplary linkages,
- develop guidelines for use in motivating and training individuals to develop and maintain effective linkages under various conditions, and
- prepare workshop materials to encourage more frequent and more effective use of the guidelines.

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[1]The term "defense establishment" is being used here in a very broad sense to encompass all agencies, public and private, directly concerned with defense preparedness, including: (a) the defense industrial base consisting of prime contractors, subcontractors, and suppliers to defense contractors; (b) active duty military personnel; (c) civilian employees of the Defense Department; and (d) reserve forces and the National Guard.

The overall objective of the project is to assist in achieving the nation's goal of enhancing defense preparedness by fostering a greater number of truly integrated--and truly effective--vocational education-defense establishment training programs. It is our hope that this report, by providing an overview of the history and current status of vocational education-defense establishment cooperation, will assist in achieving this important goal.

In keeping with the directions of the Department of Education, this report, and in fact the entire study, is concerned not only with collaborative efforts between vocational education and defense industries, but also with linkages between vocational education and the armed forces. Actually, as will be discussed later, this need to develop linkages with the defense establishment can best be viewed as one segment of the larger picture of industry-education cooperation, with the word "industry" synonymous with the term "employer," whether public or private.

The specific purpose of this report is to provide a status report on the progress and problems of collaborative efforts between vocational education and the defense establishment. An earlier, draft version of the report, based almost entirely on a review of relevant publications and other documents, was prepared in March 1984 and circulated to a number of advisors for review and comment. Since that time, a nationwide search for possible exemplary linkage efforts was instituted, primarily through distribution of the project brochure and through other dissemination activities by the National Association for Industry-Education Cooperation. As a result of these efforts, contacts were established with over 200 educational institutions and employers, additional documents were reviewed, and visits were made to sites where collaborative projects were underway in California, Washington, Oklahoma, Texas, Arizona, Mississippi, and Tennessee. The present report represents the results of this combination of site contacts and literature review.

How the Report Is Organized

To provide an historical basis for this report, the next section begins with a brief summary of viewpoints expressed by representatives of various agencies concerned with defense preparedness, looks at some of the achievements of the federal and state agencies, and attempts to define the problem

more completely. Next are discussed the benefits of vocational education-defense establishment cooperation, and in Chapter III illustrations of various types of partnerships are presented. Following this, preliminary standards for evaluating the effectiveness of cooperative efforts are outlined. Some factors contributing to successful linkages are discussed in Chapter VII, after which, possible barriers to cooperation are outlined. Finally, the report summarizes our findings and conclusions.

II. THE CHALLENGE OF VOCATIONAL EDUCATION-DEFENSE ESTABLISHMENT COOPERATION

How Serious Is The Need for Improved Collaboration?

This section presents an overview of three major sources of information on the problem:

- a Congressional perspective,
- a view from the Department of Defense (DoD), and
- other economic and labor market forecasts.

A Congressional perspective. One major stimulus for the current efforts to improve the capacity of the defense industrial base has come from a report of the Defense Industrial Base Panel of the House Armed Services Committee. This report, based on an extensive series of hearings in 1980, concluded that there had been a serious deterioration in our nation's defense industrial capability, thereby jeopardizing our national security. While a number of factors were identified as contributors to the problem, of special relevance to this report are the following findings:

- The industrial base is not capable of increasing production rates in a timely fashion capable of meeting the increased demands that could be brought on by a national emergency;
- While excess production capacity generally exists at the prime contractor level, serious deficiencies exist at the subcontractor levels. The smaller subcontractors and the vendors are hit the hardest by instabilities in defense programs;
- Skilled manpower shortages exist now and are projected to continue through the decade, and these shortages penetrate deeply into the lower tiers of the defense industrial base; sub-tier contractors may be less able to withstand the hardships resulting from manpower shortages than the larger prime contractors (U.S. House of Representatives, 1980, pp. 11-15).

Unfortunately, the panel did not examine the capability of the "U.S. educational system" to satisfy the manpower demands of the defense industrial base. It did, however, suggest that the role of education, and its

impact on the preparedness of the defense industrial base, be reviewed by other House committees and the Department of Defense (p. 15).

While there may be some question concerning the timeliness of these 1980 panel findings, they continue to be cited in current reports. For example, Vawter labeled the report "perhaps the best statement of defense industrial base issues today" (1983, p. 69) and relied heavily on it for one of the chapters in his report on the history of industrial mobilization--a report that won the Industrial College of the Armed Forces Commandant's Award for Research.

A view from the Department of Defense (DoD). In discussing the views of DoD representatives separately from the House of Representatives' report, we should stress that the witnesses before the Armed Services Committee and its Defense Industrial Base Panel included both industry and DoD representatives and that DoD representatives were widely quoted throughout the report. More recent reports coming directly from DoD representatives, however, do provide a good update for the House panel findings. For example, Frank Carlucci, while serving as Deputy Secretary of Defense, addressed a seminar on vocational education and defense preparedness conducted in 1982 under the joint sponsorship of the U.S. Department of Education and the Department of Defense, with support from the American Vocational Association. He told the attendees at this seminar: "You are addressing one of the most important and difficult problems facing our nation's security today....We need the help of the education community and industry to correct the nationwide technical illiteracy that is weakening our defenses. Even the most well-designed and cost-effective weapons system program is useless without skilled craftsmen building sophisticated military equipment in our factories." In speaking about the severe shortages of personnel in many technical occupational fields caused by the shift in national priorities, he stated: "My hope is that industry and the vocational education community will join with us developing creative approaches for training workers to correct these critical shortages" (U.S. Departments of Defense and Education, 1982, pp. 52-54).

In 1981, Robert Worthington, Assistant Secretary for Vocational and Adult Education, reported that DoD projections indicated the need for 10

million new workers requiring vocational training in 41 occupational fields within the following five years. According to these projections, in many key occupations, such as machinist, the annual growth rate in defense-related industries is expected to be double that reported for all industries.

Other economic and labor market forecasts. In contrast with the unanimity of opinion that seems to exist at the Department of Defense and Department of Education levels, there seems to be some disagreement--or at least more uncertainty--in the minds of forecasters in other agencies. Sanders (1983), for example, notes that the National Tooling and Machining Association found a shortage of 60,000 journeyman machinists and predicted a shortage of 240,000 by 1985. He also reports a 1982 study of the metal-working industry that predicted a shortage of 36,000 skilled employees if the industry returns to its 1977-78 production level.

Brown and Doggett, in applying their Interindustry Forecasting System, also expressed concern about the possibility of labor shortages in selected occupations under a "high defense scenario." They note that the need to bring additional skilled personnel into the industrial base so as not to impact on nondefense output will be felt most frequently in the skilled blue-collar areas. Meeting such a requirement, they state, implies a reversal of the recent trends in employment (away from production toward the service occupations) and that the implications "extend in important ways into the educational and training programs operating within the nation" (1982, p. 1.52). In a more recent publication, Doggett (1983) goes further in his analysis of the role of defense in shaping employment and concludes that defense expenditures will take on a more important role in shaping the nation's economy. According to Doggett, defense-related employment will account for over 10% of net new jobs in nearly all industries. He also concludes that employment growth in 28 skilled labor categories will be a source of concern in one or more of the 24 major metropolitan areas in the U.S.

Dale (1983) expresses even more concern about spot shortages of skilled labor in the next few years, labeling it a "near certainty." He acknowledged, however, that "It is not as clear at this point precisely when and where these shortages will occur, or what should be done about them" (p. 159).

The past few years have shown a greater public interest in emphasizing a closer public (education) and private (employer) relationship. Testifying before the Senate Subcommittee on Employment and Productivity from the point of view of business leaders, Mitler, Chairman of TRW, Inc., called for a "national public-private effort" that would not skimp on employee development and training (American Association of Community and Junior Colleges, 1982).

From the point of view of defense concerns, economist Isabel Sawhill of the Urban Institute, in a recent paper prepared for the National Council on Employment Policy, stated that "buying more hardware does not look like a very good investment unless accompanied by a major effort to upgrade the skills of those who will have to use it." Sawhill goes on to recommend that "as the Administration makes plans to double its spending for defense, it consider...the development of new education and training systems with possible 'spillovers' for the civilian sector" (American Association of Community and Junior Colleges, 1982).

On the other hand, Starr (1984), based on his recent study of state vocational education department responses to increases in defense industrial training needs, recognized that it is not yet known whether the supply of workers with the skills needed to meet defense contract requirements will in fact be available at the time and place needed. In his study he found a general absence of a sense of urgency among the state vocational education agencies participating in his study, probably due at least in part to the lack of employment information that would convince these agencies that an urgent need existed for training efforts aimed specifically at defense contractors.

At a more general level, Rumberger has responded to the reports that a serious gap exists between the future needs of our high technology economy and the education that U.S. schools and colleges are providing. While he recognizes that some high-level technical occupations will be among the fastest growing ones during the 1980s, the 10 occupations that will produce the greatest numbers of new jobs are unrelated to high technology, most being in the low-level service and clerical fields. Furthermore, according to Rumberger, the application of technology appears likely to decrease the

skills that many existing jobs presently require. He cautions that while an increasing number of workers will use computers in their jobs, "the use of increasingly sophisticated technologies does not require that workers have increasingly sophisticated skills" (1984, p. 344). Wilms' survey of the sample of 172 employers in the Los Angeles area provides some recent data in support of Rumberger's conclusions. He found that only 22% of the employers interviewed with respect to entry-level jobs requiring less than four years of college reported that the required skills had increased as a result of improved technology (1984).

How Far Have Federal and State Agencies Come in Improving Collaboration?

Achievements at the national level. As noted earlier, a Vocational Education and Defense Preparedness Seminar was conducted in 1982. This seminar, in and of itself, demonstrated a notable level of cooperation among these agencies. At this seminar, Carlucci cited some of the linkage efforts under way in the Defense Department, including the "Tools for Schools" program that provides loans of plant equipment to vocational programs. According to Carlucci, since 1974 nearly 300,000 students have graduated from programs receiving support from DoD, with some $52 million in equipment being used by 83,000 students in the Fall of 1982. He noted that one of the initiatives being taken to enable industry "to participate more fully in the revitalization of our nation's technical manpower base" will be the making of firm commitments for multi-year procurements of certain weapons and the providing of defense contractors with up-front funds for capital investments. Carlucci expressed the hope that some of the investments would be for vocational training programs needed by those industries (U.S. Departments of Defense and Education, 1982).

The 1984 fiscal year report of the Secretary of Defense (Weinberger, 1983) provided some additional details on the activities being undertaken to help American industry improve its ability to respond in case of a national emergency. Relatively little attention is devoted in the report to specific activities to resolve civilian labor shortages except to cite the development of the Defense Economic Impact Modeling System (DEIMS) for delineating the impact of defense requirements on manufacturing capabilities and providing to

both public and private sectors information on projected defense and non-defense manpower requirements for 72 skilled labor categories. The hope was expressed that this information would help alleviate current and potential shortages of skilled personnel and encourage new entries into the job market. In the area of military manpower, Weinberger cited the Administration's objective of continued emphasis on military training, renewed efforts to improve the skill balance of the force, and a strengthened commitment to make more efficient use of the entire DoD workforce, military as well as civilian. However, in neither the industrial nor the military examples was mention made of obtaining assistance in these efforts from vocational education agencies.

Speaking at this same seminar, Worthington acknowledged that the Administration had taken action to strengthen our national defense preparedness and some of the direct results of these policy changes could involve vocational education, including the "expanded technological training of military personnel and civilians, as well as the additional training requirements of the industrial sector created by the demand to produce more technological and advanced weapon systems" (U.S. Departments of Defense and Education, 1982, p. 70). According to Worthington, "coping with skill shortages is important to the military services and to the defense industries; and this can become an exciting challenge for many of you in the next few years" (p. 72).

Besides the convening of this seminar, Worthington described two other joint activities of ED and DoD: (1) the formation and operation of the Defense Preparedness Task Force, which established a repository of materials relating to defense preparedness and skilled worker shortages, and (2) the convening of a Defense Preparedness Review Group, representing industry, public and proprietary postsecondary institutions, state educational agencies, trade associations, and training specialists from the private sector on September 20, 1982.

State education department progress. As noted previously, Starr (1984) reported a general lack of urgency on the part of state vocational education agencies concerning the need to provide training programs specifically oriented toward defense contractors. While he recognized that some state systems have initiated efforts to provide for such needs, "a review of state

plans and annual program plans for vocational education indicates that most states do not give a visible priority to dealing with this national concern" (p. 4). He noted that despite the belief on the part of DoD and ED that vocational education and the defense industrial base should be collaborating closely, "unfortunately, such collaboration for skilled training purposes is not yet in place on a large scale and the major reasons for this situation remain unclear" (p. 25).

Starr's finding concerning the lack of urgency at the state education level has major implications for the present report, and even more importantly, for the later events in our study; for if we are to succeed in our efforts to develop effective guidelines and workshop materials, we will certainly have to be able to provide convincing arguments to motivate both the educators and the industrial representatives to initiate and maintain collaborative efforts. Meeting this challenge will depend heavily on a clear statement of the problem and an understanding of the realistic options available for constructive collaboration. The next section discusses this problem more in detail.

Problems of Industry-Education Cooperation

Reports on the lack of cooperation between business and vocational education and the need for more and better collaborative efforts have not been restricted to the issue of defense preparedness. For example, the National School Public Relations Association (1980) noted that business-industry-education activities in the U.S. were fragmented and uncoordinated. Clark has noted that effective work-education linkages require active participation and integration of resources on the part of both industry and education, rather than the traditional rhetoric calling for "communication" (1982).

The industry-education alliance issue was again addressed in the June 1983 Action for Excellence report from the Task Force on Education for Economic Growth, sponsored by the Education Commission of the States. In Action Recommendation #2 the Task Force proposed the creation of "broader and more effective partnerships for improving education in the states and communities of the nation" (1983, p. 35). Governors, legislators, chief

state school officers, state and local boards of education, and leaders in higher education were asked to establish partnerships with industry as a consortium of effort fostering school improvement. This improvement, of course, is central to the vocational education-defense establishment interface.

It appears that the same lack of urgency noted by Starr (1984) pervades industry-education cooperation in general. An illustration of this was presented in an evaluation of work-education councils sponsored by the Department of Labor (Praeger, Goldberg, Cohen, and Finn, 1980). It was concluded that many council members have not developed a sense of mission or urgency as a group; that the open-ended project had left both the councils and the intermediaries without a clear set of roles, responsibilities, and expectations; and that the consortium had had little impact on institutional change in education.

Nevertheless, there is some evidence that the priority given to industry-education cooperation is increasing. According to a survey of school districts in May of 1984, 22 percent of the respondents reported one or more partnerships existed in their district; and another 25 percent indicated interest in establishing such partnerships. Over two-thirds of the districts reporting partnerships indicated that their efforts had increased during the past three years (U.S. Department of Education, n.d.).

At the postsecondary level, a study conducted by the American Association of Community and Junior Colleges revealed that "the average community, technical, and junior college has 100 specific working arrangements with local organizations" (1982).

While the two arenas are certainly not identical, it is clear that we can learn a great deal in terms of how to improve vocational education collaboration with the defense establishment from the many years of past experience in the field of industry-education cooperation.

III. THE BENEFITS OF VOCATIONAL EDUCATION - DEFENSE ESTABLISHMENT COLLABORATION

The absence of large-scale collaboration between vocational education and defense firms (Starr, 1984) suggests the possibility of a misunderstanding as to who benefits from this collaboration. Perhaps the emphasis at the 1982 Vocational Education and Defense Preparedness Seminar may have given the impression that (other than improving defense preparedness) the only direct beneficiaries of such collaboration are defense industries and military agencies. Since they both are perceived as having far more resources than vocational training institutions, is it any wonder that Starr found a lack of urgency among most state vocational educators toward meeting the training needs of defense firms? (Why should vocational education with its severe shortage of funds devote a portion of its resources to the large defense contractors and to the federal government?)

But who in fact does benefit from collaborative efforts between vocational education and the defense establishment? Let's look first at how schools and communities benefit.

Benefits to Education and the Communities

Based on our review of the literature and our contacts with vocational educators active in these collaborative efforts, it is very clear that schools and communities benefit in every type of collaborative effort we found, not just in those cases where the benefits to schools are obvious.

Some of the broadest perspectives on school/community benefits came from interviews in Oklahoma, one of the recognized leaders in the field of collaboration between vocational education and both industry and government. Here we found the reasoning that even when customized training is provided to an employer; for example, to Tinker Air Force Base, the largest employer in the state, the individual employees benefit directly and vocational educators have a direct responsibility to serve these state residents. Going one step further--helping their "clients" increase their income in turn adds to the tax revenue of the state as well as to the financial health of the community.

Many other benefits can accrue directly to schools from their cooperative efforts with employers, including:

- technical assistance in curriculum development,
- additional job opportunities for graduates,
- opportunities for instructional-staff development,
- increased education awareness of the business point of view,
- assistance in identifying and building support for educational objectives,
- improvement of school operations efficiency through business management techniques,
- additional funds received,
- increased student understanding of how basic skills are used in business,
- upgrading of equipment and facilities, and
- enhancing the prospects for developing new programs and improving current programs.

Benefits to Business and Government Employers

While it is very possible that employers can benefit in many different ways from collaborative programs with vocational education; for example, in improved public relations and community image, their primary objective is to expand their skilled labor supply and to improve its quality in a cost-effective manner. Even employers whose sole goal is to increase profits can see that their ability to be more selective within a higher quality applicant pool can have a very direct impact on their productive efficiency.

If we look at improving the quantity and quality of the labor force in a timely and efficient manner as the overall goal, some of the near-term or intermediate benefits of improved vocational education-defense establishment collaboration include:

- improved understanding of business products, services, and policies,

- increased number of qualified job applicants,
- improved quality of new employees,
- reduced time to train new employees,
- lower training costs, and
- increased tenure of high quality employees.

Benefits to the Military

With over 500,000 new military personnel recruited each year, coupled with the vast numbers of current military needing job training, Boerrigter (1983) has noted that the potential for collaborative efforts with vocational education are virtually limitless. Some potential benefits have already been noted by Ruff, Shylo, Orth, and Fraser (1981), including:

- enlarging the number of 17- to 21-year-olds who are enlistable,
- increasing occupational knowledge,
- developing lateral-entry programs,
- providing surge-training capacity, and
- assisting in reservist training.

Plans for dramatically expanding collaboration between vocational education and the military were contained in proposed legislation (H.R. 1937 and S.801), entitled the Skilled Enlisted Reserve Training Act. This legislation would have established a program to provide high school graduates with technical training in skills needed by the Armed Forces in return for a commitment for enlisted service. Program participants would be able to receive up to 100% of the educational expenses plus an additional stipend for each month of training. To be eligible to participate, a person must be a high school graduate (or equivalent), be enrolled in an approved course of instruction at an approved educational institution in a technical occupation designated by the military service as a military occupational specialty in which significant enlisted personnel shortages exist, and must enlist in a military reserve component.

Enthusiastic support for the bill as a vehicle for delivering better technicians to both the military and the defense industrial base was shown in the Senate's first hearing on the bill in late 1983. Darrow (American Association of Community and Junior Colleges, 1983), former president of the Community College of the Air Force, stated,

> The vast majority of technical training done by the military is duplicative of that offered by the nation's 1,200-plus two-year colleges. Such training can be accomplished by civilian institutions at a much lower cost, especially when one considers the true cost of technical training done by the military.

The likelihood that this legislation will be enacted in the near future appears rather remote, however. On this issue, a statement by the Director of Training and Education for DoD, Alvin Tucker, in 1982, may still be relevant today. In response to a question concerning whether vocational programs can help prior to military training, Tucker responded:

> If you are willing to adapt, I think so. But, the Department of Defense, at this point in time, is not prepared to make the offer, because it is not yet prepared to state what it wants and what it is willing to do. I think there is room for this kind of program. The idea is very appealing and it makes a lot of sense on the surface, but I can assure you there would be a great deal of work involved in getting it up and running. A lot of selling would have to be done within DoD and within the military services to get this idea implemented effectively. (p. 10)

Our initial survey of the literature supports Tucker's view that "a lot of selling would have to be done." This need for selling is not restricted to the supplying of training services to the military, but rather poses as a major challenge underlying all collaborative efforts between vocational education and the defense establishment.

IV. EXAMPLES OF COLLABORATIVE EFFORTS

There are obviously many different ways to categorize collaborative efforts between vocational education and industry (or government). However, in line with the project goal of helping to expand the number of effective, collaborative programs between vocational education and the defense establishment, it seems most appropriate to focus on the strategies used. Accordingly, this section of the report categorizes such programs into seven different patterns of collaboration, and provides examples of each:

- Employer representatives as school advisors,
- Job-training programs for employers,
- Loans or gifts of equipment to schools,
- Employer representatives as trainers,
- Brokering of educational services,
- Small business linkages, and
- Training material repositories,

Employer Representatives as School Advisors

The National Advisory Council for Vocational Education estimates that there are over 300,000 employers, employees, and labor leaders serving on general and craft advisory committees (U.S. Departments of Defense and Education, 1982, p. 64). This figure virtually matches the number of professional vocational educators according to Bottoms. The very pervasiveness of this collaboration pattern suggests that merely having an employer advisory committee says nothing about the extent or real value of the committee; the key is how such a committee functions and how it impacts on the training program. The American Electronics Association (AEA) has recognized the need for a mechanism to streamline and update curricula, and through an industry committee has created a guidebook that identifies core curriculum topics and objectives for four electronics technician courses. According to Ms. Pat Hill Hubbard, AEA's vice president for engineering education, community college instructors and company trainers use this guidebook for creating or updating the courses (1982).

Hubbard suggests that vocational educators consider restructuring their vocational advisory committees with technically knowledgeable industry representatives (not personnel department employees) "whose singular responsibility is to keep curriculum up to date" (1982, p. 39). The importance of effective advisory committees has been recognized in the new vocational education law, the Carl D. Perkins Vocational Education Act. One provision of the Act requires that a majority of the state council members be drawn from business and that these business leaders help develop plans for spending the federal funds. Another provision of the new law requires state boards of education to establish technical committees composed of business and labor leaders in order to develop information on the skills and competencies needed to enter and progress in several occupational areas.

Job Training Programs for Employers

The development and implementation of customized training services for business and government agencies occur over and over again, across the entire country. Perhaps because they occur so often, they attract little attention, and yet there is no doubt that the nation would benefit from more high quality programs in this area. While the size and the characteristics of such programs vary immensely in the extent of employer involvement in program planning, they often involve employers working with instructors to design a single course or a multi-course program to meet the specific needs of one or more employers.

Defense industry. An illustration of one of these cooperative efforts with employers was the development in the late 1970s of a two-year Electronics Design option to the Drafting and Design Associate Degree Program at Eastfield College, part of the Dallas County Community College District in Texas. Texas Instruments (TI) was one of the Dallas County employers that provided the leadership for this new degree and continues to work on a close basis with school personnel. Full-time employees of TI are placed in the Eastfield program as full-time students for the first semester, with educational costs reimbursed by TI (providing the trainees make a grade of C or better). After the first semester, students are assigned to a regular shift for on-the-job training and further classroom instruction, with pay increases geared directly to their college success.

The Tucson Consortium for Electronics Education (TCEE) is a group of five high tech electronic firms bound together because they saw, among other things, an inadequte supply of skilled labor, and a potential growth in the demand for skilled labor. The consortium works with the school system to avoid draining the resources of any one company. Companies contribute personnel time and equipment loans while Pima College administers the program at the training center.

Another major consortium is the recently formed Southern California Aerospace Industry-Education Council. This cooperative effort, involving McDonnell Douglas, Northrop, Rockwell International, Hughes Helicopters, and a number of community colleges, is directed toward expanding the aerospace manufacturing skills base in Southern California. One of the initial efforts was the identification of generic job areas and the development of common job descriptions in aerospace manufacturing. Other council objectives include curriculum development, the supporting of key legislation, and the development of media pointing out the career opportunities in aerospace manufacturing.

A unique example of what can be accomplished at the community college level in meeting the challenge to train technicians in automation technology is the 3.3 million dollar Center for Productivity, Innovation, and Technology at the Chattanooga State Technical Community College. This center is believed to be the most sophisticated automation training facility of any two-year community college in the United States. It includes an automated office, automated design center, and an automated factory. Because of the unique equipment, area companies have used the center to fix their own equipment or make parts. The 6,000-student school expects to provide extensive training to industry on interactive graphics, CAD/CAM equipment and robotics, in addition to offering a two-year degree in automation systems technology.

Mississippi junior and community colleges are utilizing state funds to provide start-up training programs tailored specifically to meet industry's training needs. A memorandum of understanding was developed with industry, outlining what resources will be provided by the junior college, industry, and the Mississippi State Department of Education. Technical assistance is

sought from Mississippi State University to help design the program and develop the curriculum. This assures that industry is not tied down to using a curriculum that was not developed specifically for their operation. Success of this start-up training can be attributed to the rapid mobilization of state resources and the flexibility of the program so that industry is not hampered by red tape. There are currently 37 mobile training units that can be used for these start-up training programs. Their advantage is that it makes it possible to take the training to the industry rather than having the industry send employees to the college. During the last four years (1980-1984), over 22,000 employees have been trained for more than 450 companies, at a minimal cost of less than $118 per trainee. The state receives a quick return on its investment through increased tax revenues, while industry benefits from a more efficient, productive work force.

Federal government. An example of a large-scale collaborative effort between the federal government and vocational education is the program involving Tinker Air Force Base in Oklahoma City and the Oklahoma State Department of Vocational and Technical Education. The state had provided training courses for Tinker employees since 1967; however, in 1979 a unique agreement was reached between the Air Force base and the state to establish the Tinker Vo-tech Training Center in a warehouse building located on the base. Remodeling of the building interior was the responsibility of the State Vo-tech Department, with a heavy involvement of students from the area vo-tech schools. All standard training equipment was furnished by the state, while Tinker supplied the specialized aircraft-related equipment. From the standpoint of operating costs, the state supports the administration of the center while income from Tinker supports the training costs, which amount to about 75% of the total budget. For Fiscal Year 1984, the total operating budget for the vo-tech center was approximately $324,000.

Journeyman training programs have been established for seven aircraft maintenance skill areas. During the first phase of each two-year program, the Air Force employee attends classes full time for between 18 and 24 weeks, depending on the program. Instructors are typically retired federal employees, which many years of trade experience, who work part time for the vo-tech

center. Following this, the trainee is assigned to on-the-job training under supervision of a journeyman. Classes are also provided for clerical employees at Tinker as well as upgrade classes for current journeymen. Altogether, nearly 1,400 individuals were trained under the vo-tech program during Fiscal Year 1984, some 300 in the maintenance area, and approximately 1,100 in the clerical area.

The military. Providing instructional programs for military personnel is not as well known but is, nevertheless, an important service being provided by postsecondary institutions. For nearly 15 years, the Naval Air Technical Training Center has contracted with the State Technical Institute at Memphis (STIM) to teach basic electricity and electronics, job-oriented basic skills, and aviation fundamentals, as well as share the training delivery for other courses, including advanced technical subjects. In addition to the Memphis site, the Navy is using four other community colleges that are adjacent to its training sites to provide similar services. They are:

- College of Lake County, Naval Training Center, Great Lakes, Illinois
- Meridian Junior College, Naval Air Station, Meridian, Mississippi
- San Diego Community College, Naval Training Center, San Diego, California
- Philadelphia Community College, Naval Ship Yard, Philadelphia, Pennsylvania

The demand for contract instructors at the Naval Air training Center in Memphis alone has increased from 165 instructors in 1980 to about 300 contract instructors in 1983, teaching in 21 different course areas. Most of the faculty employed by the STIM to teach at the Naval Air Technical Training Center are retired Navy Chief Petty Officers, with an average of 22 years of military service in electronics or other technical areas. Besides improving training efficiency and effectiveness, this collaborative program has added stability to the Navy's instructional efforts by offseting the turnover of Navy Instructors on active duty. Also, the presence of these highly qualified contract instructors has been a valuable augmentation to STIM's regular

faculty, and has provided a strong base from which to expand college capabilities even further.

The president of the College of Lake County (Illinois) reported that in fiscal year 1983 alone, the college had trained more than 31,000 Navy students--9,000 in propulsion engineering and another 7,000 in basic electronics (American Association of Community and Junior Colleges, 1983).

Loans or Gifts of Equipment to Schools

As noted earlier, since 1974 nearly 300,000 students have graduated from programs that have received loans of plant equipment under the Defense Department's "Tools for Schools" Program, while at the present time some 52 million dollars of equipment is being used by 83,000 students under this program (Carlucci, 1983). On a more modest level, the American Electronics Association has piloted an "Equipment Bank" in which electronics companies were provided a list of items needed by community colleges in the area. According to Hubbard (1982), companies did respond but they had to be challenged to provide equipment that schools need rather than merely giving away their discards.

Employer Representatives as Trainers

Here is another pattern of collaboration between vocational education (especially at the post-secondary level) and the defense establishment that is so common it's virtually ignored. This is especially true of the numbers of defense industry employees who "moonlight" by teaching night classes on college campuses. The American Electronics Association, in recognition of the continuing need for instructors with state-of-the-art expertise, provided an opportunity for a college electronics instructor to spend his sabbatical developing a resource list of industry employees interested in teaching in local community colleges. Over 250 technicians and engineers were identified in the San Francisco Bay area; however, in the fall of 1983, it was reported that only a few colleges had tapped this resource (Hubbard, 1982).

Two more formal examples in this area are the Computer Aided Design/ Computer Aided Manufacturing (CAD/CAM) and Computer Numerical Control (CNC)

Machining at the Los Angeles Employment Training Panel Center, linking education and aerospace companies. The CAD/CAM program utilizes technical intructors from participating employers to provide the classroom training while the CNC program provides training in a mobile trailer, and technical employers participate as instructors.

Brokering of Educational Services

The Technology Exchange Center (TEC) in Southern California uses a unique brokerage technique to link industry's technical training needs to the vocational education system (Lusk, 1983). TEC serves as a broker to:

- coordinate training resources from a sizable number of community colleges to meet needs resulting from emerging technology or new industry;
- deliver trained workers for hire when needed by employers;
- determine pockets of excess labor and coordinate exchange; and
- upgrade or retrain groups of workers from companies, reducing costs to companies while increasing employment force.

TEC's brokerage technique includes the use of outside account executives, possessing a broad base of "in-house" capability, and who use traditional sales techniques: cold-calling, telephone prospecting, and referrals from satisfied customers to go door-to-door in industry to ascertain whether a company has a particular training need. These account executives then analyze this company's current training capabilities and search for unmet needs. The account executive next prepares an initial pre-curriculum outline utilizing the expertise of company personnel. Once the account executive determines what skilled labor needs may exist, company technical personnel are invited to provide information regarding specific skill requirements in a critical need area. When an appropriate course of action is determined, the Center's computer is then accessed to obtain information about:

1. training programs that may already exist, and
2. similar programs that may require only slight modification to meet specific needs.

If a program exists, they then contact the appropriate educational representative and educational institution capable of meeting this specific need.

If no educational program at the educational institutions currently exists to meet this need, then the appropriate educational representative, industry representative, and the account executive proceed to design, develop and deliver training to user specifications. Throughout the entire process, the account executive remains actively involved to assure that communication lines remain open and training occurs on a timely basis and to the satisfaction of the company.

TEC not only brokers training to the local community college but also leverages additional training from education to industry. This training may include lectures, workshops, plant tours, etc. Since about one-third of all technical jobs in the Orange County area are in the defense industrial base, the brokerage technique has had definite impact on defense preparedness.

With this brokerage process, TEC has also been able to assist the educational institutions in their planning process by projecting curriculum needs and improving upon the relevancy of their curriculum.

Programs for Small Businesses

Because the small subcontractor or vendor was singled out by Congress as a particularly weak link should a sudden national emergency occur, we have kept a special watch for exemplary linkages between such firms and vocational education. Unfortunately, our search has produced few results. This lack of collaboration has been recognized by Wilms (1984) who noted that his recent survey of California employers showed nearly half of the small firms in his study indicated that they were willing to work with schools but had not been asked. This relatively untapped area would appear to be a major opportunity for vocational educators. According to Wilms, a Department of Commerce study has shown that small businesses are a vital segment of the economy, employing nearly half of the nation's work force and providing some 86% of the new jobs in the private sector.

A truly unique example of a collaborative effort between small business, a government agency, and vocational education was found in Oklahoma. Here, thanks to the initiative of the director of the Small and Disadvantaged Business Utilization Office of the Oklahoma City Air Logistics Center, a continuing series of small business contracting workshops has been presented since 1982. The workshops are presented by representatives of Tinker Air Force Base but are co-sponsored by the Oklahoma Department of Vocational and Technical Education. The workshops, typically held at the Francis Tuttle Vo-tech Center in Oklahoma City, are aimed at providing small business with the information necessary for an intelligent decision as to whether or not to seek government contracts and if the decision is positive, how to locate the right marketplace, and submit proposals. Also covered in the workshop are the administrative actions to take after contract award.

Training Materials Repositories

The National Center for Research in Vocational Education (NCRVE) makes available military curriculum materials to vocational and technical educators. These materials can be adapted for civilian programs or serve as resources. According to information obtained from NCRVE, requests range anywhere from 100-150 yearly since 1978. These requests come from a variety of agencies and seem to be heavily weighted toward the community colleges and technical schools; but also include corporations and a mix of other requestors.

Over 150 courses are available through ERIC and over 30 vocational education resource centers have partial collections that are loaned to users; thus, the actual number of users per year may well be considerably greater than the 100-150 requests received directly by NCRVE.

For the most part, the military curriculum materials are used in the following manner:

1. Resources for curriculum development
2. Inclusion as parts of courses
3. Guidance for instructors
4. Adoption of complete courses as received

At present, there are some 1,400 courses on the NCRVE computerized database that are identified, acquired, evaluated, processed, and disseminated to educators (National Center for Research in Vocational Education, n.d.).

In addition to the NCRVE respository, the Aerospace Education Foundation, for the past 12 years, has been involved in the nonprofit sale and distribution of Air Force technical courses to more than 1,000 civilian educational systems in all 50 states. This program has fulfilled an urgent need for well-developed courses among the growing number of community colleges, helped establish credibility for the Community Colege of the Air Force, and allowed taxpayers' defense dollars to serve double duty. Purchasers of these materials are reported to be well satisfied with the Air Force materials because they are a considerable time and money saver. Follow-ups conducted by NCRVE to determine user satisfaction have indicated that the materials were "interesting, well-organized, and easily adaptable to own curriculum needs" (Aerospace Education Foundation, 1984). These materials contain highly visual course content with a self-paced structure. This foundation is supported by aerospace corporations in America.

V. DETERMINING STANDARDS OF PROGRAM EFFECTIVENESS

A Matter of Definition

At the very outset, we need to spend some time attempting to clarify the term "standards," and how it differs from the term "factors," which will be discussed in the next major section of the report. "Standards," as used in this report, are the criteria for judging the effectiveness of a collaborative effort between vocational education and the defense establishment. If a program achieves even one of these standards or criteria it can be considered a success--or at least more successful than had it not achieved the standard--providing that no negative program effects overshadow this positive outcome.

"Factors," on the other hand, are those characteristics of a program that contribute to its success, or to the achievement of one or more of the standards. Bushnell (1980), in discussing the role of vocational education in economic development, labels these factors "process or input variables." In contrast with the term "standards," factors cannot be used alone as a gauge of program effectiveness; at least they should not be used that way unless it is impossible to obtain criterion or standards data. In such cases, they may have to serve as so-called proxy measures for the actual criteria.

To be useful, these standards should be measurable, preferably in an absolute sense but at least in a relative sense so that the effectiveness of different programs can be compared.

Unfortunately, it often happens that the more significant the standards, the more difficult they are to measure, at least in a reasonable time frame. For example, everyone will most likely agree that the ultimate standard of program effectiveness in the area of vocational education-defense establishment collaboration would be the improved defense preparedness of our nation. Working with such a standard would be impossible, however, so we need to be more specific about what defense preparedness consists of. Let's say that three indicators of improvements in this area are: (1) an improved "surge" capability in our defense industrial base, enabling a rapid increase in defense production in case of an emergency; (2) greater effectiveness of our

military forces; and (3) more efficient civilian personnel in our defense establishment. Even here, the problems of measurement in a reasonable time period are extreme, if not insurmountable. We need to look further for indicators that are more susceptible to assessment in objective fashion over the near or intermediate time period.

Looking specifically at programs targeted at the defense industrial base, some useful standards might be: the number of trainees surviving a certain length of time on the job, the number of trainees initially placed on the job, or even the number of individuals graduating from the training program. It is obvious, of course, that the more one moves from ultimate criteria or standards of effectiveness toward the intermediate or more immediate standards, the more evidence--or the more faith--will be needed to support their relationship to the ultimate goals of the program. For example, a collaborative program might train a large number of individuals, but would not be considered exemplary if a significant portion were unable to find jobs, or, having found jobs, unable to keep them for a reasonable time period.

In fact, the more one has to be content with near-term indicators, the more likely one would be confronted with factors that may or may not lead to program success. Bushnell (1980), for instance, lists "effective cooperation among all agencies concerned" as an immediate outcome of job creation and development programs. While most individuals would probably agree with this outcome (or some variation of it), we should realize that even if we are able to measure this variable reasonably objectively we cannot be completely certain that such cooperation will lead to ultimate success. Cooperation is very likely a necessary factor, but not a sufficient condition of program success. Witness the number of very cooperative individuals or agencies who in fact accomplish very little, except to be happy in their cooperative efforts.

When confronted solely with near-term standards or factors, therefore, we need to collect information on as many factors as we can reasonably obtain rather than just one or two. All of these factors must appear, on a rational basis, to approximate or correlate significantly with ultimate program success. The higher that a program scores on all or almost all of these factors,

the more support we will have in our expectation that the program will be truly successful.

With these caveats in mind, let's look at some possible intermediate and near-term standards.

Some Intermediate Standards of Program Effectiveness

We need to realize that a standard, as good as it sounds, will not necessarily be appropriate for every program. With this in mind, a preliminary list of intermediate standards has been developed for further study. They are labeled "intermediate" because they are felt to be reasonably predictive of ultimate program success, but at the same time, worthy of achievement in their own right. Also, they should not require more than a year or two of program operation before the information can be collected. These proposed standards are listed below in no particular order:

- number of trainees placed on the job;
- number of graduates retaining their jobs for some specified period, for example, six months;
- an increase in the number of truly integrated vocational education-industrial training programs;
- evidence of effective use of combined resources of industry and education in such programs as internships, work experience programs, summer jobs for teachers, etc.;
- decreased costs of defense establishment training through increased utilization of instructors, training equipment, and/or materials from vocational education institutions;
- improved quality of vocational education programs as a function of greater involvement of technical experts from business and industry.

Some Proposed Near-Term Standards

Like those covered in the previous section, the standards listed below are judged to be worthy of achievement in their own right. However, for these near-term or immediate standards, we cannot be quite as certain as we were in the case of the intermediate standards that achieving these standards guarantees that the overall program will ultimately be successful. On the

other hand, one definite advantage is that the standards listed below should be capable of being applied to a program rather early in its lifetime:

- number of companies assisted,
- number of individuals trained,
- evidence of an increased number of vocational education programs designed or modified to reflect the needs of the defense establishment,
- reduction in the time needed for a training program to become operational,
- reduced time to train new employees of the defense establishment,
- evidence of effective use of industry-developed training materials in vocational education programs,
- evidence of effective use of industrial trainers in vocational education programs, and
- use of vocational education instructors and materials in industrial training programs.

It is apparent from this listing of standards, both the near-term standards of this section as well as the intermediate standards covered in the previous section, that some are much easier to quantify or measure objectively than are others. Certainly, we want to strive for objective measurement wherever possible, but we should be careful <u>not</u> to fall into the trap of assuming that the more quantifiable a standard is, the more valid it is. We should expect that judgment will play an important part in all standards development and application.

We now turn to the problem of identifying the factors that appear to increase the likelihood that a program will achieve success on one more of the standards we have been discussing.

VI. PRELIMINARY IDENTIFICATION OF FACTORS CONTRIBUTING TO SUCCESSFUL LINKAGES

As noted earlier, the term "factors" in this report refers to characteristics that appear to contribute to the successfulness of a program. A factor does not, in and of itself, define success and its presence in a program does not mean that a program is therefore a success. On the other hand, the identification of such factors is very important as we search for program characteristics that should be included in a new program to increase its likelihood of success. The more we know about the factors associated with success the greater our chances will be to design collaborative programs that achieve one or more of the standards discussed in the previous chapter.

There is much to be learned about collaborative efforts between vocational education and the defense establishment before we can identify the factors with any degree of certainty. Rather than being content with stereotypes or vague generalities, we first need to identify collaborative programs that appear to be successful and then analyze these programs to extract the factors or characteristics that appear to be important. In the interim, however, it should be helpful to see what factors have been identified as important in other studies of collaborative efforts.

In 1981, Gold, Fraser, Elswan, and Rankin prepared a directory of collaborative councils as part of their Industry-Education-Labor Collaboration Project. In their report, they identify several factors that distinguish collaborative councils. Such councils are:

- designed to treat education, industry, labor, government, and youth service institutions as equal partners;
- responsible for their own continuity;
- performance-oriented and designed to perform a variety of roles; and
- share responsibility and interests leading to mutual action.

The role of vocational education in economic development has received considerable attention in the past few years and several reports have identified factors that are worth considering for their applicability to collaborative programs between vocational education and the defense establishment. Bushnell (1980, p. 60), for example, lists a number of "process variables" some of which may be helpful for consideration in vocational education-defense establishment programs, including:

- number of other agency representatives and business leaders actively participating in program;
- availability of inservice training for staff;
- number of links with state and federal agencies;
- level of authority delegated to person with responsibility for negotiating arrangements with private industry;
- number of contractual conditions to be met by business clients participating in the program; and
- intensity of outreach effort (e.g., publicity, number of contacts, site visits).

Brant (1982, pp. 46-47), in a report on customized training by vocational educators for new and expanding industry, makes a number of general recommendations based on a study of factors that appeared to be significant for program effectiveness in the three states studied. Excerpts of some of the recommendations that may be applicable to collaborative efforts between vocational education and the defense establishment are:

- Decision-making processes regarding project eligibility and funding should be as streamlined as possible.
- Facilities and equipment should be at the ready disposal of program officials and should be up-to-date and designed to accommodate a variety of training projects. Arrangements should exist for transporting equipment to remote parts of the state when necessary.
- Mechanisms should be developed for bringing screening and selection services to client firms in the project.

- Accounting systems must be in place to accommodate complex and unique multiple-party contracts. Some institutions do not typically use such fiscal arrangements and may need to establish special business office procedures.

- Programs should have a network of field liaison agents or project coordinators who would ideally have expertise in occupational education, job analysis, general personnel practices, and at least the rudiments of industrial design and operations. Since individuals with such expertise may not be easily obtainable, some mode of inservice training should be offered to these individuals. For example, those with extensive backgrounds primarily in education may benefit from workshops and seminars in industrial development and private sector management; while those with industrial backgrounds may require some orientation to their area's educational resources.

From a study of "quick-start" economic development programs comes several criteria that were used to identify such programs (Duvall, 1983). Some elements of these programs should parallel the programs of concern in this report since the definition of quick-start programs emphasizes the meeting of employer-specific needs, their relatively short-term nature, and their ability to be started up within 15 to 30 days. These are characteristics that would very likely interest many firms in the defense industrial base.

Several of the criteria that may be worthwhile to consider as possible factors related to success of collaborative vocational education-defense establishment programs are the presence of:

- a formal policy statement,
- detailed, written policies and procedures,
- binding agreements with businesses and industries, and
- written endorsements.

Perhaps the most relevant, albeit rather general, suggestions come from the Seminar on Vocational Education and the Defense Establishment (U.S. Departments of Defense and Education, 1982). Among the factors cited in the proceedings as contributing to the success of cooperative efforts between vocational education and defense-related industry were:

- close coordination and cooperation between industry and education;
- programs and courses jointly designed by education and business;
- state leadership and commitment;
- top-level industry support;
- single point of contact for assistance;
- flexibility--programs modified on the basis of evaluation information;
- natural trust between industry and education;
- open communication between industry and education;
- mutual understanding of each other's environment and capabilities.

These lists of factors, while admittedly very preliminary and rather vague, at least present the basis for developing a more refined set of factors for testing against the successful programs.

From our own field study of ongoing collaborative programs, the following additional factors are proposed:

1. Clear recognition that providing training services to employers is actually serving individuals (their clients) and thereby fulfulling the mission of vocational education.
2. Recognition on the part of state legislatures and governors that vocational education has a definite role to play in economic development, which in turn can contribute to defense preparedness. This recognition should be supported by funds specifically earmarked for such purposes so that the more traditional programs of vocational education would not suffer financially by increased efforts devoted to industry-education collaboration.
3. Special emphasis on determining the common needs of business and vocational education.
4. Openness of communication and serious attempt to understand each other's position.
5. Realistic commitments made by vocational education to employers (promising only what can be delivered).

6. A marketing plan developed and updated periodically.

7. Staff members actually engaged in promotion and sales.

8. Recognition of the differences between the business environment and education:

   - importance of deadlines and
   - need for flexibility.

We turn now toward the consideration of some of the barriers that may be confronted in the area of collaborative efforts.

VII. POSSIBLE BARRIERS TO COOPERATION

The role of the "junior college" of the early 1960s was to provide training for the first two years of course work leading toward a baccalaureate degree. In the early 1970s this role expanded to provide students with job-entry skills in occupational education. Even with this expansion there is, to date, no real process for developing any statewide goals for vocational education with more input from industry, government, and the military. The result is that very few regions across the country have a system developed whereby industry's manpower needs are met in a coordinated fashion by educational institutions. There appears to be a lack of information available about collaborative efforts among education, industry, and the military, and certainly a trend toward the idea that, unless specifically asked, very little effort is made (by any sector) to establish collaborative efforts.

According to Wilms (1984, p. 349) there is a tendency for employers, especially small companies, not to rely on schools, college placement offices, and employment agencies as sources to fill job vacancies. Instead, these companies prefer to do their own training, primarily because schools are not providing suitable training in entry-level jobs that meet their needs. Research findings by the Institute for the Interdisciplinary Study of Education show that industry managers were evenly divided on the question of whether community colleges should play a greater role in company training programs (Useem, 1981, p. 15). However, the research findings suggest that "for the most part, business managers were pleased with the quality of community college courses offered in their companies" (p. 15).

There are some fundamental differences between the profit-oriented, short-term goals of industry and the longer-range perspective of the nonprofit educational organizations (Useem, 1981), leading to a lack of cooperation and a low mutual regard for each other.

Because of its track record, the public education system is viewed by industry as being unable to meet the high demand for technical personnel that faces our nation. School administrators, on the other hand, view industry as

very narrow-minded, concerned only with immediate profit goals. If schools could create employer-based skills training programs to more sharply focus on the needs and demands of specific employers, this would help employers reduce the costs associated with developing and maintaining their own expensive programs. However, there are certain to be obstacles and barriers that will need to be overcome in order to match the public educational system's output with industry's need for skilled labor.

General Barriers

First of all, let us look at some general barriers that might be present with any type of collaborative effort between education and industry or between education and various elements of the the defense establishment. An overview of what the literature identifies as potential barriers that might limit the viability of a joint, long-term effort is presented below:

- lack of direction on the part of both entities in coordinated planning and the establishment of scope and objectives;
- lack of communication channels, or limited communication occurring only at top levels with no coordinated internal dissemination effort between those who are specifically involved in the activities;
- mismatch of short-term goals vs. long-term goals and "top down" vs. "bottom up" management relative to the two decisionmaking structures, creating differences in policies, procedures, and objectives;
- legislative efforts creating bureaucratic red tape resulting in an inability of both entities to accomplish their desired goals;
- "single-source" funds that can be available quickly but just as quickly dry up.
- inflexibility on the part of school or industry to make available resources to make the effort work.

A closer look is necessary now to separate out some specific barriers that would result from collaborative efforts between education and industry.

Barriers Inhibiting Collaborative Efforts Between Industry and Education

Recent studies by Useem (1981) and Starr, Maurice, Merz, and Zahniser (1980) identify barriers that tend to reduce the likelihood for education and industry cooperation. A summary of these include:

- schools moving slowly in areas of creating new programs and courses, or in hiring full-time faculty while industry moves rapidly in personnel and policy changes;
- inability of educational institutions as stable institutions with long-term plans to deal with industry's short-term predictions on manpower needs;
- lack of flexibility to offer courses at times that differ from the traditional academic calendar and for shorter periods (few days, weeks, or months) of time;
- schools receiving sporadic company support;
- difficulty in coping with programs that are fashioned and specifically tailored to a particular company's requirements;
- company equipment being damaged by student use;
- possibility of trade secrets being exposed;
- instability in corporate personnel because of rapid turnover rate;
- product lines or working groups appearing and disappearing causing discontinuities and lack of commitment;
- lack of agreement on research planning;
- different funding cycles;
- criticism by industry of community colleges' rigid credentialing of appropriate instructors;
- community colleges' feeling that company-based instructors are too narrow-minded;
- no contract of agreement as to exactly what each entity would be responsible for accomplishing.

Barriers Inhibiting Collaborative Efforts Between Education and the Military

Let's now look at and identify barriers that reduce the likelihood for education and military agency cooperation (Ruff et al., 1981; Flynn, 1982). These barriers include:

- vocational educators having a limited understanding of the military difficulty in relinquishing ownership of their training programs so as to encourage a closer cooperative relationship with vocational training institutions;
- the need to develop an efficient method whereby the military can evaluate the compatibility of vocational training programs;
- preconceived ideas reflecting concern that the public educational system is engaged in quasi-military training;
- the military's apprehension that it will lose its full control over military training;
- the apprehension that the public education system will be co-opted by the military if the military commits substantial resources to external training;
- the mismatch of the two decisionmaking structures;
- misconceptions of military personnel about civilians lacking specialization to teach while military is viewed by vocational education as not employing vocational graduates in tasks that challenge their training;
- the idea of developing trained personnel for "export," since military personnel tend not to stay in the community.

VIII. FINDINGS AND CONCLUSIONS

Based on extensive document review, supplemented by telephone and on-site discussions with educators and employers, the following patterns of collaboration between vocational education and the defense establishment were identified and illustrated:

- Employer representatives as school advisors,
- Job-training programs for employers,
- Loans or gifts of equipment to schools,
- Employer representatives as trainers,
- Brokering of educational services,
- Small business linkages, and
- Training material repositories.

Some of the factors that appear to be instrumental in the success of these linkage efforts are:

1. Clear recognition that providing training services to employers is actually serving individuals (their clients) and thereby fulfulling the mission of vocational education.
2. Recognition on the part of state legislatures and governors that vocational education has a definite role to play in economic development, which in turn can contribute to defense preparedness. This recognition should be supported by funds specifically earmarked for such purposes so that the more traditional programs of vocational education would not suffer financially by increased efforts devoted to industry-education collaboration.
3. Special emphasis on determining the common needs of business and vocational education.
4. Openness of communication and serious attempt to understand each other's position.
5. Realistic commitments made by vocational education to employers (promising only what can be delivered).
6. A marketing plan developed and updated periodically.
7. Staff members actually engaged in promotion and sales.

8. Recognition of the differences between the business environment and education:

   - importance of deadlines and
   - need for flexibility.

On a more general level, the following conclusions are proposed as a means of gaining a clearer perspective on the problem of vocational education-defense establishment collaboration:

- Vocational education-defense establishment collaboration should be viewed as part of a much larger problem of industry-education cooperation, or more appropriately perhaps, employer-education cooperation. The greater this overall cooperation the more likely it will be that vocational education's relationship with the defense establishment will flourish. On a very practical level, most businesses are or could well be defense contractors, subcontractors, or vendors at one time or another. Suppliers particularly may be working on defense business one day and nondefense business the next.

- Defense preparations are not independent of other urgent concerns impacting on skilled labor. Many of the same types of efforts that aim, say, at stimulating economic development or enhancing industrial productivity can also be applied to enhance vocational education collaboration with the defense establishment.

- Both the immediate and long-term results of improved collaboration should be viewed in a broader light of overall mutual benefits to both vocational education and to the defense establishment--not solely in terms of improved defense preparedness. Schools need to benefit directly and vocational educators need to feel that the schools can benefit if there is to be any chance of overcoming the lack of urgency that has been reported. Anything that helps either party in this collaboration helps the entire program.

- Regardless of who initiates the efforts to expand cooperation between vocational education and defense-related agencies, at the earliest time the local school agencies and the local businesses must be brought together. Federal and state agencies could help increase this cooperation with significant benefits to economic development and to defense preparedness at relatively modest cost.

At no time in recent history has the future looked so bright for education-industry cooperation as it does today. Michael Timpane, in his

recent article on business involvement in public schools, states, "Of all the recent changes in the landscape of American education, none has been more dramatic and swift than the reappearance of the business sector: (1984, p. 389). This bright future for business involvement in education certainly holds promise for vocational education.

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